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NOTE ON COMET *c* 1914 (NEUJMIN).

The third comet of the year was discovered by NEUJMIN at Simeis on the 27th of June. An orbit based upon Dr. AITKEN'S observations of the 2d, 16th and 30th of July was derived by Mr. C. D. SHANE and the writer. The most interesting thing about the orbit is the great perihelion distance, which amounts to 3.74 astronomical units, i. e. 348 million miles. The comet made this nearest approach to the Sun on July 24th. It is moving in an orbit plane inclined 71° to the plane of the ecliptic.

On account of its great perihelion distance (which is the second largest known) its heliocentric motion is small, so that it will probably be within reach of large telescopes for several months. On this account an ephemeris is given in *Lick Observatory Bulletin* No. 260, extending to the end of this year. Comparison of this ephemeris with an observation made by Dr. AITKEN on the 26th of August shows the following representation: (O–C) $\Delta\alpha = -1^s.9$ and $\Delta\delta = +20''$. At present the comet is moving slowly toward the northeast thru *Ophiuchus*. It will cross the equator in right ascension $17^h\ 32^m$ on the 24th of September. It is nearly four astronomical units distant from the Earth so that it can be seen only with fairly large telescopes.

R. T. CRAWFORD.

BERKELEY ASTRONOMICAL DEPARTMENT, September 14, 1914.

SOME FEATURES OF THE SPECTRA OF IRON AND CHROMIUM IN THE VACUUM ARC.

The arc burning in a partial vacuum is known to give greater sharpness to the spectrum lines in general and greater strength to the enhanced lines, as compared to the arc in air. Other effects due to the altered character of the discharge have been noted in the few investigations made with this source.

The writer has recently arranged a set of fittings for a vacuum arc which may be used when desired in the chamber regularly employed for the electric furnace. The arc electrodes are controlled by hand by means of rods passing thru stuffing boxes in the end of the steel chamber. Preliminary observations have been made with iron and chromium arcs chiefly for the purpose of testing whether the differences observed between the spectra of the furnace in vacuum and the arc in air are due in any large degree to the difference in pressure of the two sources.

The photographs, taken with the first and second orders of a 15-foot concave grating, show that while differences in relative intensity occur between the arc in vacuum and in the open air, these are not in the direction of greater similarity to the furnace spectrum, but indicate rather stronger arc conditions for the vacuum arc, as would be expected from the ability of this source to bring out metallic enhanced lines.

The sharpening effect of the vacuum arc is very decided, however, for certain chromium lines which are very diffuse in the arc in air. Such lines are rendered sharp by the vacuum furnace, and the effect is apparently due to the reduced pressure employed. Perhaps the most striking cases are three very diffuse lines given in the violet region by the arc in air. The only measures attempted of these have been made by EXNER and HASCHEK, who give the wave-lengths to one decimal place. The vacuum arc and also the furnace in vacuum show two of these lines to be each composed of three lines, the intensity gradation of the group accounting for the appearance of the line in the arc in air, where the components widen and blend together. The third of the diffuse lines narrows to a single line the vacuum arc. The sharpness attained is sufficient to allow almost the same precision of measurement as is given by the ordinary arc lines.

The following measurements were made of these lines on a vacuum-arc plate, the dispersion being $1^{mm} = 1.86$A. The values are referred to adjacent lines measured by EXNER and HASCHEK:—

Arc in air (EXNER & HASCHEK)	Vacuum arc.	Nearest solar line, element and intensity (ROWLAND).		
4098.0	4097.80	4097.808	..	0
	4098.11	4098.115	..	0
	4098.33	4098.335	Fe	5
4111.1	4111.02	4111.021	Mn	1
	4111.51	4111.509	Ce?	1
	4111.82	4111.827	..	00
4129.4	4129.36	4129.337	Ce–	3

It is seen from this table that a solar line occurs with a wave-length agreeing closely with each of these chromium lines. Some of them are given by ROWLAND as due, at least in part, to other elements in the Sun. If these chromium lines are really present in the Sun, it would mean that the conditions of the solar atmosphere are capable of sharpening lines in a way accomplished in the laboratory by a vacuum source.

The arc between iron terminals in vacuum presents some interesting features. A pink glow surrounds the point on the positive pole from which the arc proceeds. Towards the negative pole the vapor is bluish green, with an absence of the yellow envelope given by iron oxide when the arc burns in air. This negative glow gives the iron arc lines strongly, while the discharge at the positive pole is especially effective in giving the spectra of hydrogen and nitrogen, probably supplied by the residue of air in the chamber. The reddish glow is due to a high intensity of Hα. Bathed plates covering the region from λ 5000 to λ 6700 show Hα several times as strong as the brightest iron line in this range, which includes the brilliant arc lines of the green-yellow, a region to which the plate is more sensitive than to Hα. The line Hβ, which appears on other plates, is faint relatively to neighboring iron lines, the vacuum arc appearing to give a strong intensity gradient between the two members of the hydrogen series. At the negative pole, Hα may be detected, but is very faint.

In the violet and blue, the spectrum given near the positive pole of the iron arc is dominated by the nitrogen bands belonging to the second positive group of DESLANDRES. A similar phenomenon was noted by HAGENBACH for the copper arc in vacuum. The bands are strong and the dispersion employed gives a good resolution of the component lines. The weakness of the iron lines at the positive pole is very pronounced, the exposure time required for these being about fifty times as great as at the negative pole.

ARTHUR S. KING.

MT. WILSON SOLAR OBSERVATORY, September 16, 1914.

NOTE ON THE SYSTEM OF EPSILON HYDRÆ.

The object of this note is to call the attention of astronomers interested in measures of radial velocity to the fact that the stars A and B in the system of ϵ *Hydræ* are now approaching